CHAPTER 4

COSTS FOR WIRELESS E911

INTRODUCTION

Chapter 4 discusses the Federal Communication Commission's (FCC) order to the wireless carriers regarding cost recovery for wireless E911, the impact of the FCC order on the Washington state study, and the costs of Phase I and Phase II service. This chapter consists of the following sections:

A. FCC Order on Cost Recovery for Phase I and Phase II
B. Impact of the FCC Order on the 1998 Washington State Study
C. Types of Costs for Phase I and Phase II Technical Components
D. Cost Drivers for Phase I and Phase II Technical Components
E. Wireless Carriers Costs for Phase I and Phase II.
F. PSAPs Costs for Phase I and Phase II

A. FCC ORDER ON COST RECOVERY FOR PHASE I AND II

The FCC stipulated in Docket Number 94-102 relating to wireless E911 service that the Phase I and Phase II requirements imposed on the wireless carriers only apply if:

> " (1) A carrier receives a request for such E911 service from the administrator of a PSAP that is capable of receiving and utilizing the data elements associated with the services; and (2) a mechanism for the recovery of costs relating to the provisions of such services is in place."[1]

The FCC did not define cost recovery or prescribe a particular E911 cost recovery methodology. The FCC did not think that there was a need for such action because all the parties agreed that the wireless carriers must be able to recover their costs of providing E911 services. There was no evidence that state or local officials were attempting to prevent a carrier from doing so. The FCC rejected the idea of imposing a federal cost recovery mechanism. The FCC said:

> "An inflexible Federal prescription would deny carriers and government officials the freedom to develop innovative cost recovery solutions tailored to local

[1] The FCC Docket 94-102, page 53.

conditions and needs. Such a prescription also might unintentionally discourage carriers from developing creative technological approaches to E911 deployment. Thus, Federal action at this time actually might undercut and delay efforts to deploy wireless E911 capabilities." [2]

B. Impact of the FCC Order On the 1998 Washington State Study

If the FCC had prescribed a cost recovery methodology for wireless E911, the Department of Revenue would have collected the data and developed a cost recovery analysis based on the guidelines. However, since there is no federally prescribed cost recovery methodology, the Department collected and analyzed the data based on the fiscal analysis process that is commonly used in the Department of Revenue to estimate the impact of proposed legislation (fiscal notes). When the Department is asked to analyze a tax rate for a proposed program, the fiscal analysis includes generating a tax rate that is adequate to meet the program needs, revenue projections for up to six years, and local and state expenditure projections for up to six years. The Legislature reviews this fiscal analysis when considering passage of the tax legislation.

The data needed to determine a tax rate for a specific program typically includes:

- The total costs for the program.
- The types of costs that are to be funded by the tax (i.e. fixed costs, ongoing costs).
- How quickly revenue has to be generated to meet the costs.
- The size and composition of the tax base.
- The administrative costs of the tax, when appropriate.
- Any inadvertent fiscal or policy impacts that may result from the tax.

In this study, the Department tried to determine a tax rate that would generate adequate cost recovery revenue for wireless E911 service. The Department worked with the technical workgroup to identify the types of costs and the cost drivers, and surveyed the wireless carriers and PSAPs regarding their costs. The results of the surveys are the topics for this chapter.

[2] FCC Order, Docket No. 94-102, paragraph 90, page 45.

C. TYPES OF COSTS

Chart 4. A outlines the technical components for Phase I and Phase II and the recurring and non-recurring costs that are associated with each technical component. Most of the technical components (67 percent) have monthly recurring costs. There is also an installation charge for each technical component.

The non-recurring costs are one-time costs that may also include installation charges and maintenance contracts. Nine technical components (33 percent) have non-recurring costs. These include PSAP equipment (# 7 to # 12), software features at the wireless switch, voice band modem to control the Global Positioning System (GPS) receiver, and the GPS enabled handset.

In Washington, the E911 tariff applies to the costs for the technical components that comprise the current E911 network. This includes the wireline selective routing, the dedicated 911 trunks from the central office to the selective router and from the selective router to the PSAP, wireline database administration, and data circuits from the E911 database to the PSAP. The E911 tariff does not apply to costs for the other technical components. The companies that provide the technical components determine the cost.

D. COST DRIVERS FOR PHASE I AND PHASE II

The primary cost drivers for the Phase I and Phase II technical components are the current E911 network and the wireless networks. The current E911 network consists of 80 PSAPs, 2 E911 databases, 11 E911 selective routers, and a number of dedicated trunks. The wireless networks consist of 18 wireless switches, over 1,650 cell sites and over 3,950 cell sectors. The number of connections between the wireless switches and the selective routers will increase as the carriers expand their networks. This may result in a change in costs. Table 4. A summarizes the components of the current E911 network and the wireless network.

Chart 4. A
Recurring and Non-Recurring Costs for Current E911 Network, Phase I and Phase II

Technical Components (TC)	*Dedicated 911 trunks from Central Office to Selective Router	*Dedicated 911 trunking from selective router to PSAP	911 Selective Routing (Wireline)	E911 Database (add space for wireless)	Database Administration	Data circuits to existing E911 database	PSAP controller (add capacity)	ALI modem (upgrade for speed)	Telephone System/ TDD Terminals	ANI display (new hardware and software)	ALI display (new hardware and software)	CAD system	Administration	ALI steering interface	Dedicated trunks from MSC to selective router	Dedicated facilities from MSC to selective router	Software features (MSC)	Routing Translation (Wireless)	Data links to private vendor (SS7 or other signaling)	Service Control Point (SCP)	Relational PSAP Database	Mapping	Location Determination Tech. data extraction equipment	Voice band modem to control GPS receiver (for advanced GPS handset	GPS enabled handset	Position determining Equipment (per cell site 1:2)	TDOA location processor at MSC
TC Numbers	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Wireline																											
Wire E911	RC	RC	RC	RC	RC	RC							RC														
Phase 1			**RC**	**RC**	**RC**	**RC**							**RC**	**RC**													
Phase 2			**RC**	**RC**	**RC**	**RC**							**RC**														
PSAP																											
Wire E911**					RC	RC	*NRC*	*NRC*	*NRC*	*NRC*	*NRC*	*NRC*	RC														
Phase 1					**RC**								**RC**														
Phase 2					**RC**		***NRC***	***NRC***		***NRC***	***NRC***	***NRC***	**RC**									**RC**					
WIRELESS																											
Phase 1				**RC**	**RC**								**RC**		**RC**	**RC**	***NRC***	**RC**	**RC**			**RC**					
Phase 2				**RC**	**RC**								**RC**				***NRC***	**RC**					**RC**				
VENDOR																											
Phase 1				**RC**	**RC**	**RC**							**RC**	**RC**					**RC**	**RC**							
Phase 2				**RC**	**RC**	**RC**							**RC**	**RC**					**RC**		**RC**		**RC**	***NRC***	***NRC***	**RC**	**RC**

Key

RC= Monthly Recurring Costs for Current E911 Network

NRC= Non-Recurring Costs for Current E911 Network

RC = New Monthly Recurring Costs Phase I and II

NRC =New Non-recurring cost for Phase I and II

* Increase in trunks due to increase in call volume not technology.

** Costs for instant recall recorder, logging recorder and printer, power supply included in intial cost for wireline E911 service.

TABLE 4. A
COMPONENTS OF THE STATE E911 SYSTEM AND WIRELESS NETWORKS

COMPONENTS	NUMBER
PSAPs[3]	80
E911 Databases	2
911 Selective Routers[4]	11
Dedicated 911 Trunks	Data Not Available.
Wireless Switches	18
Estimated Cell Sites	Over 1,650
Estimated Cell Sectors (3 sectors/Cell)	Over 3,950

The number of wireline companies, wireless carriers and vendors also drives the costs. There are two wireline companies that manage the state E911 network—US WEST and GTE.[5] There are currently ten facility based wireless companies that operate the wireless network in the state. There are also an unknown number of PCS companies that have licenses to build networks in the state and may do so at some time in the future.[6] There are two vendors that have contracts with wireless carriers located in Washington state to provide Phase I service—SCC and XYPOINT. There are several Phase II vendors nationwide but none that have signed contracts with companies that do business in Washington state. Table 4.B summarizes the telecommunications companies and the vendors.

[3] In Washington, there are 80 PSAPs—including county and Washington State Patrol (WSP) PSAPS-- to answer all wireline and wireless 911 calls. Every county has at least one primary PSAP that answers 911 calls or seven digit emergency numbers. Some counties also have secondary PSAPs that answer 911 calls transferred from the primary PSAP. PSAPs have a minimum of two call answering/dispatch positions that are staffed by trained personnel 24 hours a day, seven days a week. There are five WSP PSAPs that are primary for answering wireless 911 calls. There are dedicated 911 call receiver positions at the WSP PSAPs but no staff to fill the positions on a regular basis. WSP dispatch personnel answer the calls and dispatch them.

[4] The local wireline telecommunications system consists of interconnected networks owned by the large incumbent telephone companies such as US WEST and GTE, the small telephone companies, and the competitive local exchange companies (CLEC). Wireline companies have over 350 central offices in the state. These central offices link to 11 regional switches in-state and two regional switches in Idaho to serve portions of the Washington-Idaho border. There are seven US West and four GTE regional switches instate and two GTE regional switches in Idaho.

[5] There are currently 30 wireline companies in Washington State—22 local telephone companies and 8 CLECs. These wireline phone companies have business arrangements with US WEST and GTE to provide E911 service to their customers.

[6] The facility-based wireless carriers provide 911 service to their customers as well as to the customers of resellers.

TABLE 4. B

COMPANIES INVOLVED IN E911 SERVICE DELIVERY IN WASHINGTON STATE

TYPE OF COMPANY	NUMBER OF COMPANIES
Wireline Companies	2
Wireless Carriers	10
Phase I Vendors	2
Phase II Vendors	Data not available

Other factors that drive costs include the following:

- staff time;
- the number of emergency service numbers in the Phase II relational PSAP database;
- the number of highways, roads, driveways or real property parcels that have to be adjusted for latitude and longitude for Phase II mapping;
- the number of customers that have GPS enabled handsets for Phase II service, if the wireless carriers choose a GPS handset solution.

Table 4. C lists the cost drivers for Phase I and Phase II technical components.

TABLE 4. C

COST DRIVERS FOR PHASE I AND PHASE II TECHNICAL COMPONENTS

TECHNICAL COMPONENT	COST DRIVERS
Selective Routing	Number of cell sectors, 911 selective routers, trunks from the wireless switch to the selective router, Emergency Service Numbers (ESN), and PSAPs.
E911 Database	Automatic Number Identification (ANI): Number of trunks from wireless switch to selective router. Automatic Location Identification (ALI): Number of cell sectors, E911 databases, 911 selective routers, PSAPs, ESN.
E911 Database Administration	Number of databases and staff hours.
Data Circuits	Number of databases and PSAPs.
PSAP Controller	Number of PSAPs.
ALI Modem	Number of PSAPs.
ANI Display	Number of PSAPs.
ALI Display	Number of PSAPs.
Computer Aided Dispatch	Number of PSAPs.
Administration	Number of technical and legal staff hours dedicated to wireless E911 in the telecommunications companies and the PSAPs.
ALI Steering Interface	Number of 911 databases.
Dedicated Trunks (wireless switch to selective router)	Number of wireless switches and 911 selective routers.

TABLE 4. C (CONTINUED)

TECHNICAL COMPONENT	COST DRIVERS
Dedicated Facilities (wireless switch to the selective router)	Number of wireless switches, 911 selective routers and circuits.
Data Links to Private Vendors	Number of wireless carriers, Phase I and Phase II vendors.
Software Features	Number of wireless switches.
Routing Translation	Number of wireless switches.
Service Control Point (SCP)	Determined by network design. Affected by the number of vendors, carriers, and traffic (911 calls).
Relational PSAP Database	Number of PSAPs (relational database for PSAP boundaries), and ESNs (relational PSAP database for public safety jurisdiction boundaries).
Mapping	Number of highways, roads, driveways, or number of land parcels depending on method chosen and how accurate the maps have to be. Whether the mapping is done by the state or county or on contract with a private vendor affects the cost.
Location Determination Technology Data Extraction Equipment	Number of wireless switches, cell sites, PSAPs, and selective routers.
Voice Band Modem to Control GPS receiver	Number of wireless switches and PSAPs.
GPS Enabled Handset	Number of subscribers, pricing chosen by the companies.
Position Determining Equipment (per cell site 1:2)	Number cell sites by coverage needs.

E. WIRELESS CARRIERS COSTS FOR E911 SERVICE

OVERVIEW OF PHASE I AND PHASE II COSTS

The wireless carriers' costs for Phase I service include the network costs, technical and legal staff time, plus the costs of the Phase I vendor services. The network costs include the internal costs to upgrade their own network and the costs to install dedicated 911 trunks from their wireless switches to the E911 selective routers.[7]

The wireless carriers contract with vendors to provide Phase I service. The vendors charge the wireless carriers on a per subscriber or per PSAP basis with a cap on the charges. The contracts do not usually extend more than three years because the wireless carriers have to be able to provide Phase II by 2001 according to the FCC mandate. The wireless carriers expect their costs may change at that point.

The wireless carriers' Phase II service costs include the network costs, the costs that they now incur for Phase I service, plus vendor costs for Phase II service if they choose a solution that has a vendor cost.

TOTAL WIRELESS CARRIER COSTS

One of the fundamental pieces of information that the Legislature needs to know to determine the base of a tax, the revenue it has to generate, and a suitable tax rate is an estimate of total costs to implement and operate wireless E911 in Washington State. To determine an estimate of the total costs, the Department designed a cost survey with the input and review of the technical workgroup.

The survey tried to capture enough detail and information to verify the costs associated with the major network components and the vendor costs. The survey did not try to determine the cost for each technical component. Vendors provide many of the wireless E911 technical components and the cost of these components is included in the vendor charge to the company. The wireless carrier costs typically include the costs of the remaining technical components.

The Department and the technical workgroup did not try to develop a strict definition of costs because they did not have enough network knowledge of each carrier to make the cost definition inclusive. The Department realizes that there may be costs included in one carrier's estimate that are not included in another carrier's estimate (See Appendix F for a copy of the cost survey).

[7] This study assumes that the cost to install dedicated 911 trunks from the MSC to the selective routers is included in the wireless carrier's cost. This was our understanding when we examined the costs in the technical workgroup.

The Department also realizes that the wireless carriers may not have chosen their Phase II technology. Accordingly, the survey focuses on the costs for Phase I and asks the status of the cost estimates for Phase II.

The Department discussed the survey with the wireless carriers and assured them that the data would be kept confidential under the confidentiality agreement each wireless carrier signed with the Department. The wireless carriers agreed to try and complete the cost survey but expressed the following concerns:

- Their Phase I cost is based on national cost estimates and it would be difficult to isolate Washington State costs.
- The national cost estimates capture economies of scale that may not be realized if Washington State costs are isolated.
- There are significant differences between the carriers, and it may be difficult to get a true picture of costs in the aggregate.
- Cost information changes from year to year and the information may be outdated within a short time.
- The vendors may have confidentiality clauses in their contracts with the wireless companies that prevent the release of vendor cost information.
- The wireless carriers' pricing structures are incompatible with the Department of Revenue's cost questionnaire.

RESULTS OF THE WIRELESS CARRIER COST SURVEY

The survey did not produce the substantiated cost data that the Department needs to calculate the total costs for the Phase I and calculate a tax rate. The Department had the following concerns about the survey data:

- Only one company completed the survey as requested providing estimated line item costs, and calculating the cost per subscriber based on the line item costs.
- The data from the other companies is incomplete. They provided data for part of the survey but not for all of it.
- Some of the companies said they would submit data but did not.

- Most companies submitted the cost recovery per subscriber per month that they say is needed to recover their costs. They did not provide actual cost data to support these rates.

- Some companies provided vendor information and others did not

- Those that did not provide the vendor information said that they could not because of confidentiality agreements that they signed with their vendors.[8]

Although there was not enough data to calculate total costs, there was enough data to make some general statements about the cost recovery that wireless carriers say they need.

FINDINGS FROM THE WIRELESS CARRIER COST SURVEY

The wireless carriers reported that to recover their non-recurring costs as well as their recurring costs for Phase I service, they would need reimbursement ranging from no less than 20 cents per subscriber per month to no more than 33 cents per subscriber per month.

To recover their Phase I recurring costs only, the wireless carriers would need reimbursement ranging from no less than 15 cents per subscriber per month to no more than 27 cents per subscriber per month.

The non-recurring and recurring costs for Phase I differed between large carriers and smaller carriers.

Smaller carriers indicated that they need to recoup Phase I non-recurring costs within one to three years. The larger carriers report that they will recoup costs over a three-year period.

Some carriers indicated that the cost reimbursement per subscriber will decrease after the non-recurring costs are recouped.

Most of the wireless carriers indicated that the Phase I data provided in the survey is valid for no more than three years.

The wireless carriers reported that they do not have any cost estimates for Phase II because they have not chosen the technology at this time.

[8] The Department asked if the confidentiality agreement that the Department signed with all of the companies would be adequate protection for the wireless companies and the vendors. The wireless companies did not think that it would provide adequate protection.

F. COSTS TO THE PSAPS FOR PHASE I AND PHASE II

PHASE I

The PSAPs report that their costs for Phase I will be the charges that wireless carriers bill the PSAPs for the service. There may also be some additional database administration cost that can be absorbed with current revenues. There will be no equipment costs to the PSAPs for Phase I.

It is not known if the wireless carriers will bill the PSAPs on a cost recovery charge per subscriber or on actual costs that are outlined in an implementation plan submitted by the wireless carriers.

The Department cannot substantiate or calculate an estimate of the costs to implement Phase I based on the cost recovery per subscriber data that the wireless carriers submitted in the survey. However, the Department used the survey data to calculate an estimate of how much the PSAP payments to the carriers would be if Phase I service was implemented at the cost recovery rates that the wireless carriers outlined in survey. The Department made the following assumptions when calculating the PSAP payments:

- Only the carriers that responded to the survey bill the PSAPs.
- These wireless carriers bill at the cost recovery per subscriber rate that they stated in the survey and that rate stays constant for four years. They will not bill actual costs.
- The subscriber count only includes the subscriber count for the wireless carriers that responded to the survey.
- The subscriber count is constant for a calendar year.
- Phase I service was operational for calendar year 1998 and continues until December 31, 2001.
- The cost recovery over the four-year period includes cost recovery for non-recurring and recurring costs according to each carrier's cost recovery schedule.
- The number of subscribers for the first year is 1.26 million.
- The subscriber growth rate is 15 percent for the second year, 13 percent for the third year, 12 percent for the fourth year.

- The growth rate assumes that the wireless industry hits market saturation in 2007 at 47 percent or the population and subscribers continue to grow until 2007 but growth decelerates. Rate of deceleration is based on the past and is adjusted to meet 2007 saturation. Growth information is based on national and western state wireless industry data.

- The wireless carriers continue to charge the PSAPs on a monthly basis for all their subscribers even if the cap on vendor charges for the wireless carriers has been reached.

Based on the survey data, the PSAP payments to the wireless carriers for Phase I total $3.4 million for the first year, $3.8 million for the second year, $4.3 million for the third year and $4.8 million the fourth year. The total amount paid for Phase I service for a four-year period is $16.3 million.

The average amount PSAPs pay per subscriber for the first year of Phase I service is 22.5 cents per subscriber per month and 21.8 per subscriber per month for the remaining years. Table 4 summarizes the amount the PSAPs would pay from 1998 to 2001 for Phase I service.

TABLE 4. D

AMOUNT FOR PHASE I THAT PSAPS PAY TO CARRIERS (BASED ON INDUSTRY COST RECOVERY DATA)

YEAR	SUBSCRIBERS	AMOUNT PSAPS PAY TO CARRIERS	AVERAGE AMOUNT PSAP PAYS PER SUBSCRIBER PER MONTH
1998	1,262,916	$3,406,641	22.5 cents
1999	1,452,354	$3,796,706	21.8 cents
2000	1,641,159	$4,290,276	21.8 cents
2001	1,838,098	$4,805,109	21.8 cents
TOTAL	N/A	$16,298,732	N/A

PHASE II COSTS

The Phase II PSAP costs include the wireless carrier charges for Phase II service, PSAP equipment replacement, and mapping. The wireless carrier Phase II charges are not known at this time. The research and development is ongoing with Phase II technology and most of the wireless carriers have not chosen Phase II technology.

PSAP EQUIPMENT REPLACEMENT

Phase II requires a mapping display at the call taker position. It is not known at this time if the mapping display will be in the 911 equipment, the computer aided dispatch (CAD) system, or in both, if CAD equipment and the 911 telephone system merge into an integrated system.

The PSAP equipment replacement period is five years because the vendors do not provide software support for the equipment after five years. Some PSAPs are already replacing their equipment and others have installed new equipment as a result of the E911 wireline implementation.

The Department and the technical workgroup conducted a survey on PSAP equipment replacement. The following assumptions were made:

- Phase II will be implemented as scheduled by the FCC in 2001.
- All PSAPs (80) are equipped to handle wireless calls. This includes the Washington State Patrol PSAPs.
- All the PSAP equipment in the state will be replaced in 2001 to accommodate Phase II service. This includes equipment at 405 call taker positions in the state.
- There is no further consolidation or regionalization of PSAPs beyond what is in place as of December 31, 1998.
- Equipment replacement cycle is five years.
- 911 equipment quotes are from the current 911 equipment vendors that the counties use—CML, Positron, Plant and 911, Inc.
- CAD equipment costs are from current CAD vendors that the counties use—PRC, Spillman, and New World Systems.
- 911 taxes from wireline and wireless subscribers will be used for equipment replacement because not all of the costs are due to wireless Phase II service.[9] For purposes of this analysis, 911 and CAD equipment costs are split equally between the wireless and wireline 911 tax revenues.

[9] In 1997, PSAPs answered 4.5 million calls—3.7 million (83percent) from wireline callers and 738,000 (17percent) from wireless callers.

- Annual 911 equipment and CAD system costs are equal to the purchase price of the equipment plus four years of maintenance costs divided by five.

The estimated cost to replace PSAP equipment in 2001 totals $28.8 million--$14.4 million from the wireless 911 tax revenues and $14.4 million from the wireline 911 tax revenues. Table 4. E summarizes the initial PSAP equipment replacement costs in 2001.

TABLE 4. E
INITIAL 2001 EQUIPMENT REPLACEMENT

PSAP EQUIPMENT	TOTAL 2001 COST ($ IN MILLIONS)	50% FROM WIRELESS E911 TAXES	50% FROM WIRELINE E911 TAXES
911 equipment	15.6	7.8	7.8
CAD equipment	13.2	6.6	6.6
Total	**28.8**	**14.4**	**14.4**

The estimated cost to upgrade the 911 equipment and pay for maintenance agreements over the five-year equipment replacement cycle totals $50.7 million--$10.1 million per year. Table 4. F summarizes 911 equipment upgrades and total maintenance for the five-year equipment replacement cycle.

TABLE 4.F

5 YEAR EQUIPMENT REPLACEMENT COSTS

COSTS ($ IN MILLIONS)	E911 EQUIPMENT	CAD EQUIPMENT	TOTAL COST (
TOTAL 5 YEAR COST FOR EQUIPMENT UPGRADE	21.70	14.50	**36.20**
TOTAL 5 YEAR COST FOR EQUIPMENT MAINTENANCE CONTRACTS	8.70	5.80	**14.50**
TOTAL 5 YEAR COST	30.40	20.30	**50.70**
ANNUAL COST	6.08	4.06	**10.14**
50% FROM WIRELESS E911 TAX	3.04	2.03	**5.07**
50% FROM WIRELINE E911 TAX	3.04	2.03	**5.07**

MAPPING

Counties are making an effort to correct maps to reflect latitude and longitude. Currently, ten counties have GPS-corrected maps and three more counties are in the process of developing corrected maps. There is a wide range of costs to produce a GPS map for the state depending on the level of accuracy desired. The costs are highest when the degree of accuracy requires every parcel in the state to be GPS-corrected. The 1997 property tax statistics indicate that there are 2,662,065 real property parcels in Washington state. The estimated cost to GPS-correct is $7 per parcel which totals $18.6 million for the state.

Mapping costs are considerably less if the maps are corrected by driving the centerlines in the state, collecting GPS data and correcting the maps.[10] A preliminary estimate is $10

[10] Centerline files were originally developed from United States Geological Survey files. The following process is used to adjust a map based on centerlines. Put the map to be corrected on the computer and go to the area. Record latitude and longitude points for reference. Drive the centerline of the roads using GPS equipment to collect the raw GPS data. Go back to the base station, run the GPS data through a software

per centerline mile and a base charge of $3,000 per county. There are 79,588 centerline miles in the state. The estimated total cost is $1 million.

Complete implementation of Phase II is not possible without a GPS-corrected map. However, there are several issues with mapping that need to be addressed. GPS corrected maps will be used by more parties than the E911 agencies. Costs should be shared. Until a plan is developed, it is difficult to determine the total costs and the portion 911 should bear. It is not known who will develop the map—counties, state or both. It is also not known what resources there are to coordinate the parties, complete a need assessment and cost analysis, and develop an implementation plan.

program and generate accurate latitude and longitude readings. Maps can be corrected for latitude and longitude in levels. The costs depend on level of correction. The following list indicates the different levels of GPS correction: interstate highways, state highways, county roads, city roads--main, city residential roads, primary county roads, secondary county roads, and a priority list--private roads, forestry roads, Indian reservations, and government agency roads.

CHAPTER 5

FUNDING AND COST RECOVERY FOR WIRELESS E911 IN OTHER STATES

INTRODUCTION

Most of the states are currently debating how to fund wireless E911 service and how to provide cost recovery for the wireless carriers, PSAPs and in some cases the local phone companies for implementing and operating wireless E911 service. Some states are not taking any action. Some are studying the problem. Others have passed funding and cost recovery legislation and are in the process of implementing the legislation and Phase I service. Some of these states are saving funds for Phase II implementation. Phase II tests are being conducted in some states, but no state is moving towards full Phase II implementation at this time.

For purposes of this study, the Department reviewed the legislation in other states and conducted a phone survey of the thirteen states that have funding and cost recovery provisions in their statutes. Nine states participated in the phone survey.[1] These states discussed how they developed their funding mechanism, how they plan to administer the cost recovery process, the challenges they are facing, and the advice they would give to other states. Chapter 5 summarizes the results of this research. The chapter consists of the following sections:

A. Funding Mechanisms for Wireless E911
B. Cost Recovery Provisions for Wireless E911
C. Phone Survey Findings Regarding Cost Recovery

A. FUNDING PROVISIONS FOR WIRELESS E911

The wireless E911 funding mechanisms chosen by other states typically include monthly taxes or surcharges. Either the state or local government imposes the tax or surcharge.

The states use a variety of bases, which are the units of value to which the tax or surcharge rates are applied, to determine the amount due. The bases include:

- Per wireless connection that has a service address within the state.
- Per wireless connection that has a billing address within the state.

[1] The states that participated in the phone survey were Arkansas, Georgia, Indiana, Iowa, Mississippi, Oregon, Rhode Island, Tennessee, and Virginia.

- Any mobile identification number (wireless phone number) that has an area code in the state.
- A wireless phone number with an area code in the state and a billing address in the state or local jurisdiction.
- Per subscriber based on service address in the state.
- Per subscriber based on billing address in the state.
- Per instrument based on service address in the state.
- Per radio communication access line in the state.
- The total charge on the wireless phone bill. In this case the rate is a percentage of the total charge on the wireless phone bill.

The tax or surcharge rate, which is the amount of money that is charged per month, range from 32 cents to $1 per month. In some states the rate is fixed. In other states, there is a maximum rate. With a maximum rate, the state or local governments or a designated authority can change the tax or surcharge rates periodically but the rate cannot exceed the maximum level.

When asked how the states determined their tax or surcharge rates, the answers varied. Some states used the cost recovery per subscriber rate that wireless carriers provided for Phase I service. Others equalized the E911 tax or surcharge rate for wireline and wireless phones. Some set a maximum rate that can be adjusted annually by a state or local government or other designated authority. None of the states that participated in the survey said that they calculated their tax rates based on data provided by the wireless companies on the actual costs to implement Phase I service.

The Indiana State E911 representative, Ken Lowden, said that they were one of the first states to pass an E911 fee on wireless phones to implement Phase I. When they were developing the E911 fee rate, the wireless carriers did not have actual cost data because they had not implemented a Phase I system. That is why they based the rate for the fee on the cost recovery rate that the wireless carriers said they needed rather than actual costs. However, now the wireless carriers have implemented Phase I systems and can line item the costs. If Indiana was to develop the fee now, Mr. Lowden said that he would base the rate on actual costs. The costs for the Phase I implementation in Indiana indicate that the costs are higher in the rural areas than the urban areas and higher for the smaller carriers than the larger companies. Mr. Lowden said that their 25-cent per subscriber per month fee that Indiana allows for wireless carrier reimbursement may be too low now that they are reviewing the costs submitted by the wireless carriers for Phase I service.

There are some variations in funding mechanisms. Some states establish a separate E911 account and allow the E911 account to retain interest as part of their funding mechanism.

Iowa has the authority to issue bonds for purchasing PSAP equipment and reimbursement of landline and wireless carrier's cost for equipment upgrades. They also have a monthly surcharge for wireless carrier reimbursement.

Oregon established a monthly tax for Phase I that will sunset on June 1, 2001 if not reviewed. They expect that the tax will be reviewed and a new rate established for Phase II service.

B. COST RECOVERY PROVISIONS FOR WIRELESS E911

ELIGIBILITY FOR COST RECOVERY

Most state statutes authorize the wireless carriers and the PSAPs to recover costs. Some allow the wireless carriers, the PSAPs and the local telephone company to recover costs. Only one limits cost recovery to PSAPs only.

TYPES OF REIMBURSABLE COSTS

Some states list in statute the types of reimbursable costs for wireless carriers and PSAPs. For wireless carriers, the costs typically include designing, upgrading, purchasing, leasing, programming, installing, testing or maintaining all necessary data, hardware, and software required in order to provide the service as well as the incremental costs of operating the service. Some states also authorize payment of an administrative fee to the wireless carriers for the cost of collecting and remitting the tax or surcharge. The administrative fee ranges from one to three percent of the gross tax or surcharge collected. In some states the wireless carrier can retain the administrative fee from the tax or surcharge collected and remit the balance. In other states the wireless carrier remits the tax or surcharge and receives reimbursement.

For PSAPs, reimbursable costs listed in statute typically include lease, purchase, or maintenance of wireless enhanced emergency telephone equipment, including the necessary computer hardware, software, the database provisioning and incremental expenses directly related to the FCC Order or other handling of wireless emergency calls.

Some states do not specify the types of reimbursable costs in statute but authorize a specially appointed board, a state agency or local government agencies to determine the costs that are reimbursable.

ADMINSTRATION OF COST RECOVERY

All of the states that authorize cost recovery have an administrative body to oversee the recovery. In some states, the state agency that currently manages the wireline E911 service also manages the implementation and cost reimbursement for wireless E911.

Many states authorized a separate wireless board to oversee the implementation and operation of wireless E911. The boards are comprised of representatives from the wireless industry, the 911 community, a state agency such as the Treasurer or Auditor, and in some cases state legislators. The number of board members ranges from five to thirteen. In several states the board members are appointed by the governor.

The board duties and powers vary. Some have oversight only, with no rule making authority. Others have rule making, management, reimbursement and audit authority for wireless E911 implementation and ongoing operation. Duties may include, but are not necessarily limited to:

- Determining the tax or surcharge rate either annually or as needed.
- Reviewing and either approving or disapproving reimbursement requests from the wireless carriers and PSAPs.
- Dispersing funds from the wireless E911 account.
- Submitting annual reports to the state auditor.
- Hiring and retaining an independent third party auditor.
- Drafting rules.
- Conducting cost studies.
- Preparing reports for the legislature.
- Advising their legislature on the need to raise or lower the tax or surcharge rate on wireless subscribers.

In some states the wireless boards operate independently from state or local governments. The wireless board establishes the wireless account in a bank and hires a third a party auditor. In Mississippi, the wireless board collects the monthly service charge on the wireless phones, deposits the revenues into the account and distributes the revenues.

The states usually authorize the wireless boards to retain no more than 2% of the wireless tax or surcharge revenues for board administrative costs.

VERIFICATION OF COSTS

The wireless E911 boards require some form of cost verification before the boards will authorize reimbursement. Some boards hire an independent third party auditor who is responsible for receiving, maintaining, and verifying the accuracy of any proprietary information submitted by the wireless carriers. Some boards set a requirement that the PSAPs and wireless carriers provide verification of costs as requested by the board. Other boards require invoices or "sworn invoices."

Indiana requires a detailed cost recovery plan which the board must approve before the wireless carrier implements Phase I service. The board requires full, certified, sworn statements and costs for reimbursement. The board will reimburse the wireless carrier for full cost recovery as long as the payment of the invoice does not result in payment of

more than 125 percent of the total amount of the surcharge contributed to the fund by the wireless carrier.

C. PHONE SURVEY FINDINGS REGARDING COST RECOVERY

In the phone survey, the Department found that Indiana and Oregon have made significant progress toward implementing Phase I in their states. The information regarding their experience may be helpful to the Legislature and for that reason the Department will outline what they have done in detail. The other states that participated in the phone survey are in the process of setting up their boards or are just starting to work with the companies on Phase II implementation. The second part of this section explains the challenges that they face.

INDIANA

Indiana currently has four counties with Phase I service and fifteen counties ready to implement Phase I service. The first checks to the wireless carriers for cost reimbursement were sent in November 1998.

The Indiana legislature authorized an 11 member wireless E911 Advisory Board to set the wireless fee to insure full cost recovery over a period of time for wireless carriers and PSAPs and to oversee the implementation of wireless E911. The Board consists of five members from the PSAPs, five members from the wireless carriers, and the state treasurer as the chair.

The maximum fee cannot be more than $1 per subscriber per month. If the Board sets the fee at less than $1 per subscriber, the fee cannot be raised or lowered more than once a year. If it is raised, it cannot be raised more than seven cents each time. The revenues are deposited in a wireless emergency telephone system fund.

In May 1998 the Board established a 65-cent per month per wireless subscriber rate based on the wireless carriers' opinion that they could provide the Phase I service for 25 cents per subscriber per month. The rates for the PSAPs and Phase II were added to the wireless carriers' 25 cent amount. Table 5. A outlines the allocation of the wireless E911 monthly fee.

TABLE 5. A

ALLOCATION OF INDIANA'S WIRELESS E911 MONTHLY FEE

PURPOSE	AMOUNT IN $
Wireless Carrier Cost Recovery	.250
Wireless Carrier Administrative Fee	.013
Wireless Board Administrative Fee	.013
Escrow for Phase II	.030
Divided Among PSAPs	.344
Total Monthly Subscriber Fee	.65

The Board created a three-member cost recovery committee consisting of a PSAP representative, a certified public accountant from the Treasurers Office, and the board's attorney to review the details of each carrier's cost recovery plan and report to the Board. This assures that the wireless carrier's proprietary information will be reviewed in a confidential manner and that the Board will have enough information to make a decision.

The wireless carriers submitted implementation plans with full, certified, sworn statements and costs to the oversight board. The wireless costs were estimates because the local phone companies in Indiana did not provide costs to the wireless carriers for the local phone companies portion of the E911 wireless service. The Board advised each wireless carrier that they must return in the first quarter of 1999 and present the Board with the true costs verified with invoices and the board will settle the differences.

The wireless carriers determine a cost recovery amount per subscriber that they submit to the Board, along with subscriber counts and actual costs, for reimbursement. To calculate the cost recovery amount, each wireless carrier divides the non-recurring and recurring costs by their subscriber count. To reduce the non-recurring costs at a faster rate, the Board has approved a higher cost recovery rate per subscriber.

The Indiana Board found that the cost recovery amount per subscriber was higher for the smaller wireless carriers. They will reimburse at a higher rate to assist the smaller carriers but will not go over 125 percent of the 25-cent wireless carrier fee.

The Indiana Board has also found that the most significant cost driver for wireless Phase I service is the local wireline charges for connecting the wireless and wireline systems.

Resellers of wireless service and prepaid wireless phone cards are the two revenue collection concerns of the Indiana Board. The resellers do not always collect and remit the fee and it is difficult to obtain information from the wireless carriers regarding the resellers. With the prepaid wireless phone cards, it is not clear who pays the 65-cent fee

to the fund each month or how to insure that the total amount due is collected over the number of months the prepaid phone card is used.

OREGON

The Oregon legislature authorized a state tax of 75 cents per month per instrument based on service address until December 31, 2001. The wireless tax pays for cost recovery for the wireless carriers, PSAPs and the local phone companies. The legislature determined the tax rate by equalizing the wireline and wireless rates.

The Oregon State E911 Office is in charge of implementing wireless E911 service and now has Phase I service available in parts of the state. Oregon paid the wireless carriers a non-recurring fee per subscriber for implementation of Phase I service. Then they pay the wireless carriers a monthly fee per subscriber for service. The average cost recovery charge over the three-year contract, including the non-recurring charge, is 22 cents per month per subscriber.

The Oregon State E911 Office has found that the costs are going down and the wireless companies will make an adjustment soon because the infrastructure has not been as expensive as the wireless companies thought it would be.

If the tax is not reviewed by June, 2001, the tax will sunset. The State E911 Office hopes to have Phase II costs by then.

OTHER STATES

A variety of activities are happening in the other states. Some states are conducting cost studies before they implement Phase I service.

California paid for a Phase I test in 1998 and is in the process of analyzing the results, including costs. California also plans to conduct a paid Phase II test over a 64 square mile area in the Pasadena area in 1999 and analyze the costs and the implementation issues. The consultant will finalize a report by December 31, 1999.

Some states have just passed wireless E911 legislation and are setting up oversight boards.

In other states, the boards are in the process of determining what costs are eligible for Phase I reimbursement.

Some states are waiting for the local phone companies or the wireless carriers to choose and provide costs for a Phase I solution.

Some of the states have the funding and oversight boards in place but say that they are having with difficulty with costs for the following reasons:

- The wireless carriers say they do not have final costs because they did not consider recurring costs (line charges) and the impacts.

- Some wireless carriers want to charge small PSAPs a flat rate of $200 per month regardless of the number of customers. This is causing disagreement and delaying finalization of the contract.

- There was not much to add to the current E911 system to implement wireless E911 service. The state cannot figure out where the cost is. The state has hired a cost consultant to validate costs.

- There is concern that the local phone companies may charge PSAPs or wireless carriers for upgraded equipment that is part of the local phone company network and should not be charged to wireless E911.

- There is also concern that the local phone companies may be double dipping on costs by charging the PSAPs and the vendors for the same cost item.

- The wireless interconnection costs with the local phone companies are high. The prices keep going up.

- It is difficult to get proprietary information on the number of subscribers or the costs from the wireless carriers.

The other problems that the states say they have encountered include:

- The state wireless E911 law is ambiguous. When the board tries to do something, they have to request an attorney general opinion. This delays implementation.

- There is no agency that has a list of wireless carriers in the state. The board does not know who the wireless carriers are or how to contact them.

- There is no state E911 Board or statewide administrative infrastructure to coordinate E911 wireless implementation. Each jurisdiction has local control of E911 service and there are 135 jurisdictions. The number of PSAPs in the state is unknown.

The Department asked if there were any other comments or advice that the state E911 coordinators would give to those states that were considering Phase I implementation. The coordinators said:

- Do not pass faulty legislation. It is hard to fix it up and hard to live with it until it is fixed up.

- Give the board rule making authority.

- Set the tax rate base on actual costs. If we knew then what we know now we would have set a higher rate.

CHAPTER 6

THE COUNTY WIRELESS E911 TAX

INTRODUCTION

The county wireless E911 tax is the only tax on radio access lines for E911 purposes. Chapter 6 examines the background of the tax, revenues collected and issues pertaining to the tax. The chapter includes:

A. Background of the Wireless E911 Tax
B. Revenue Profile
C. Use of the Tax
D. Tax Administration Issues.

A. BACKGROUND OF THE WIRELESS E911 TAX

In 1994, the Legislature authorized the counties to impose an E911 tax in an amount not to exceed 25 cents per month on radio access lines (Chapter 82.14.B RCW). The legislature intended the tax to provide additional funding to the PSAPs to offset the workload impacts of handling wireless E911 calls.

Twenty-seven counties imposed the tax in 1994. The remaining counties imposed the tax between 1995 and 1998. Some of the counties that imposed the tax later did not think that they had enough radio access lines in the county in 1994 to merit a new tax. In some counties, the county commissioners chose not to impose a new tax. Because the counties imposed the tax at different times, the latest being August 1998, the Department does not have a full year of tax revenue data for all of the counties. The Department does have data for thirty-seven counties for 1997 and for three years for some of the counties. Most of the counties did not collect revenue in 1994 because they imposed the tax in the last quarter of the year and the tax collection did not begin until 1995 (See Appendix H). Table 6.A outlines the numbers of counties that implemented the tax from 1994 to 1998.

TABLE 6.A

NUMBER OF COUNTIES THAT IMPLEMENTED THE WIRELESS E911 TAX

YEAR IMPLEMENTED	NUMBER OF COUNTIES
1994	27
1995	4
1996	3
1997	3
1998	2
TOTAL	39

B. REVENUE PROFILE

In 1997, the county E911 wireless tax revenue in 37 counties totaled $2.9 million. Eight large counties collected $2.4 million, which is 82 percent of the total county wireless E911 revenue. The other 29 counties collected $.5 million which is 18 percent of the total county wireless E911 tax collected (See Appendix H).

From 1996 to 1997, the large counties experienced a 23 percent increase in county wireless E911 tax revenue from $1.9 million in 1996 to $2.4 million in 1997. Table 6.B illustrates the revenue growth in large counties in 1996 and 1997.

TABLE 6.B

COUNTY WIRELESS E911 TAX REVENUE FOR LARGE COUNTIES IN 1996 AND 1997

COUNTY	1996	1997	% CHANGE
Clark	$104,996	$133,852	28%
King	1,011,903	1,228,631	22%
Kitsap	64,241	83,520	30%
Pierce	253,142	298,641	18%
Thurston	66,809	90,161	35%
Snohomish	199,759	240,672	21%
Spokane	135,187	195,544	45%
Yakima	81,323	95,071	17%
Total	$1,917,360	$2,366,092	23%

C. USE OF THE COUNTY WIRELESS E911 TAX

There are no statutory provisions directing PSAPs as to the specific use of the county E911 wireless tax. Most of the smaller counties combine the wireless funds with other PSAP revenues for general operational costs such as call taker salaries, equipment purchases or upgrades, maintenance, and training. However, the smaller counties do account for the wireline and wireless E911 revenues separately by using different county fund numbers in their records.

Other counties are using the wireless tax revenues to fund additional personnel to handle wireless calls. King County, for example, tracks the number of wireless calls by PSAP and distributes the wireless tax to the PSAPs according to the percentage of wireless calls that they answer. They also set a portion aside in the reserve account.

D. TAX ADMINISTRATION ISSUES

Some counties say that they are having some difficulty with wireless E911 tax administration for the following reasons:

- The counties do not have the resources to audit the number of taxable radio access lines that each wireless carrier has.
- There are no county E911 tax returns.
- Remittances fluctuate monthly.
- County officials don't know how many resellers are operating in their counties.
- When contacted by the counties, the resellers say their wireless carriers are collecting and remitting the tax. Counties have no way to verify this.

Some wireless carriers start paying late when they enter a county or when the ordinance went into effect. These wireless carriers have been reluctant part to pay the county E911 tax retroactively because they say that it is the counties responsibility to notify the wireless carrier of their tax responsibility when the wireless carrier starts the service in that county